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ABSTRACT

The panoply of possible factors contributing to the observed earnings differences between blacks and whites exceeds current analytical abilities. Thus, this paper concentrates on a limited range of factors: skill differences among workers, geographic location (or labor market), and race. Skill differences are measured by schooling and experience levels. The analysis allows for interactions with specific labor markets instead of averaging across different labor markets and uses data from the Public Use Samples of the 1970 census to estimate the three factors being examined. The study indicates that differences in regional geographic location of black and white workers have a rather modest effect on aggregate earnings differences. Differences in schooling and experience, when isolated, could account for 11 to 14 percent of the earnings gap between races. However, if schooling and experience levels are held constant, 90 percent of the earnings gap would be closed if the groups were equally rewarded for their skills. Because of limited information about skill differences among workers, it is not possible to conclude that the earnings differences are caused solely by discrimination. A substantial portion of the measured differences could be explained by qualitative differences in schooling and experience. (Author/WD)

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SOURCES OF BLACK-WHITE EARNINGS DIFFERENCES

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Abstract

The aggregate differences in the earnings of blacks and whites are well known, but the sources or determinants of these differences are much less known or understood. A variety of factors--including skill differences, varying demands for workers, and discrimination--probably influences the observed differences. Yet, disentangling these factors and assessing their relative importance has been difficult.

This paper concentrates upon earnings variations that result from background or "skill differences" (schooling levels and labor market experience), differences in the rewards to these characteristics, and differences in the labor market locations of blacks and whites. Using data from the Public Use Samples of the 1970 Census of Population, individual earnings functions specific to race, schooling groups, and specific local labor markets are estimated. On the basis of these, estimates of the importance of the three sources of differences are made.

This estimation indicates regional location differences between black and white workers have a rather modest effect on aggregate earnings differences. Differences in schooling and experience, by themselves, could account for 11-14 percent of the earnings gap between races. However, holding constant the schooling and experience levels of blacks and whites, ninety percent of the earnings gap would be closed if blacks earned the same for schooling and experience as whites did.

Nevertheless, because of the limited information about "skill differences" among workers, it is not possible to conclude that this is simply discrimination. Perhaps a substantial portion of the measured differences could arise from qualitative differences in schooling or experience, unmeasured ability differences, and so forth. Distinguishing between pure discrimination and the effects of unmeasured worker differences is not possible within the confines of available data. This work does place a bound on possible influences of discrimination, however, and the potential effect is large.

An unmistakable fact of U.S. society is the disparity of incomes between blacks and whites. At an aggregate level, the income of a typical black family is some 60 percent of that for a typical white family.[1] It is less clear what causes these differences. While race per se undoubtedly enters, it is clearly an oversimplification to label all differences simply as due to discrimination. The typical black and white worker differs in terms of schooling, experiences, job choices, residential location, and a myriad of other factors that might affect earnings. The determination of the importance of each of these possible sources of differences is essential whenever one considers possible policies that might be introduced to ameliorate the observed differences.

This paper attempts to decompose the observed earnings differences between blacks and whites into more fundamental factors. These differences can, very generally, arise from a variety of underlying factors--including differences in the schooling and experience levels of individuals (as highlighted by much active governmental policy), differences in the "quality" of schooling and experiences, differences in "general abilities" of the population, and differences in the rewards to these factors.

The problem is, however, more complicated than this. The rewards to any specific factors represent market outcomes that aggregate the supplies of individual characteristics and the demands for these. The demands for specific factors may well vary across labor markets, implying that the rewards, say

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[1] The precise ratio varies depending on the specific year, the comparison made (such as family income, individual income, etc.), and so forth. Yet, no matter what the comparison, the observed differences remain substantial.

for given amounts of schooling, may vary across labor markets. When earnings of individuals are aggregated and compared across race, the specific distribution of individuals across labor markets will enter into aggregate earnings.

The panoply of possible explanations and factors entering into observed earnings differences far exceeds our current analytical abilities. As a result, all analytical efforts must concentrate upon a more limited range of factors. This analysis is no exception. The focal point of this analysis is the interaction among skill differences of workers, geographic location (or labor market), and race. Skill differences are measured by schooling and experience levels. The novelty of the analysis is allowing for interactions with specific labor markets instead of (as is more typical) averaging across different labor markets. The motivation for this is described in the next section.

The generalization of the analysis to consider interactions with specific labor markets is, however, not without costs. Both because of data limitations and because of the necessity to simplify the analysis in other dimensions, the characteristics used to describe differences among individuals are quite parsimonious (schooling and experience levels).[2] This introduces some ambiguities into the analysis. If we look at individuals with the same measured characteristics such as same age and years of schooling, the earnings, even within a given labor market, can differ. This could arise either because of differences in unmeasured characteristics, such as quality of schooling, or because of discrimination. As discussed below, differentiating

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[2] As described below, some attempts are made to capture differences in school quality. Further, the analysis does control for employment status and work time.

between "unmeasured quality differences" and discrimination is generally not possible. It is possible at least to place bounds on the magnitude of such differences--regardless of which underlying explanation is true. But, within the confines of the available data and the analysis, it is not possible to go further in decomposing the earnings differences.

This work builds upon general analyses of earnings determination. However, there is no single model of earnings determination; instead, there have been a variety of alternative approaches, each highlighting a different aspect of labor market operations. This research melds together the key elements of the major approaches followed in the past.

1. THE ANALYTICAL FRAMEWORK

The currently dominant strand of research utilizes the framework of human capital. This approach concentrates upon supply side decisions of individuals. Individuals make a series of investment decisions, such as schooling or on-the-job training decisions. These decisions are made with the expectation of higher earnings in the future: Individuals pay for training that enhances skills, either through direct payments or through foregone earnings. Once obtained, these increased skills can be marketed, and the individual receives higher future earnings. This approach has been pursued in a multitude of theoretical and empirical studies (see, for example, the reviews by Mincer(1972) and Rosen(1977)). The focus of these studies is heterogeneity of workers, as measured by such things as schooling differences, ability, and experience. Observed earnings differentials are explained by differences in worker characteristics.

However, while human capital research is the dominant stream of research, it is not the only one. An alternative view, which historically preceeded this research, concentrated not on differences among workers but on aggregate earnings differences as related to characteristics of workers' employment. In particular, aggregate earnings differences have been decomposed by employing industry, by occupation, and by location or region of employment. While these studies have seldom considered differences in worker characteristics,[3] the implicit notion is that these employment characteristics represent the key determinants of earnings differences. Although generally not explicit, the underlying notion seems to be that barriers in mobility of workers prevent adjustment to earnings differences and allow differences in demands for workers to be reflected in wages.

A third line of research concentrates explicitly upon the demand for workers. This research generally begins from consideration of production functions and develops the derived demand for different workers based upon the production technology. This line of modeling, which assumes fixed supplies of workers, has generally concentrated upon international wage differences or intertemporal wage differences for a given country (e.g., Dresch(1975)).

These research efforts have seldom been integrated in any way.[4] This seems both peculiar and unfortunate. Each of the separate research lines appears to offer some confirmation of the importance of the different perspec-

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[3] An exception is Fuchs(1967).

[4] There are a few scattered exceptions to this statement. As noted, Fuchs(1967) considers both differences in individual characteristics of workers and regional or labor market differences. Johnson(1970) considers relative demands simultaneously with migration and regional differences. Nevertheless, there has been little effort to consider systematically the importance of the different perspectives.

tives. For example, virtually all human capital studies find that different characteristics of workers are highly correlated with earnings differences; each of the decompositions, based upon industry, occupation, or region, likewise find significant differences in earnings; and, finally, demand studies show systematic earnings variations which are consistent with underlying notions of production functions and the derived demand for labor. Yet, this joint consistency with the different perspectives should make one suspicious. The models of earnings determination captured by the various perspectives are quite inconsistent with each other.

The inconsistencies arise in several areas. Human capital models assume perfect mobility of workers and competitive labor markets; the aggregate decompositions, however, rely upon limited mobility and barriers to competition (in the employment dimensions identified by the separate studies). Human capital models ignore any demand differences while the others bring these to the forefront. Aggregate decompositions, as noted, generally neglect differences in workers (or compositional differences in the labor force at the aggregate level), demand studies generally look at quite crude differences in the labor force (say schooling in two or three classes), and human capital studies consider at times quite extensive descriptions of individual worker differences. The result is that these separate analyses provide conflicting explanations of the source of individual earnings differences.[5]

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5. Part of the differences in the studies may not be so much a reflection of inherent contradictions as simply consideration of different phenomena. For example, the focus of the demand studies is typically consideration of aggregate wage differences among countries or across extended time periods. In these, assumptions of fixed supply of labor (of specific types) might be apropriate, even though apparently contradictory to the focus of supply side models of the human capital type. Nevertheless, even after making allowances for the different focuses of the studies, it seems difficult to neglect the evidence that each type of study provides for the others.

When we consider racial differences in earnings, yet more models come into the picture. Much of the attention has concerned the existence and potential magnitude of discrimination. On a theoretical level, a variety of alternative models have been suggested (see, for example, Freeman(1974)). One class of models, following the initial work of Becker(1957), assumes competitive labor markets with discrimination entering through the preferences of white employers or employees. A second class of models assumes imperfect labor markets with whites being able to command some market power (e.g., Thurow(1969,1975)). A third class concentrates upon information and "statistical" hiring decisions (e.g., McCall(1973) or Spence(1973)). A final class highlights the structure of the labor market per se and the possibility of institutional restrictions (see, for example, the review by Cain(1976)).

The related empirical work on discrimination is, however, only loosely connected to the theoretical analyses. The essence of the empirical work is the estimation of empirical earnings functions which attempt to characterize differences among individuals in some detail. Once done, the question becomes whether or not one can detect differences across race--either in the intercept or various slope parameters of the earnings relationship. The difficulty in interpretation arises first from one's judgment about the adequacy of measurement of individual differences in skills. In particular, differences across race could simply reflect mean differences in characteristics not measured or poorly measured in the earnings estimation. For example, if school quality systematically differed by race and was not adequately measured, race differences could be observed even though "identical" workers of different races were paid exactly the same. Some attempts have been made to consider these issues with regard to school quality (e.g., Welch(1972) or

Weiss(1970)) and with regard to ability (e.g., Griliches and Mason(1972)). Even beyond the measurement issues, there is a deeper issue of interpretation. Do observed differences arise from employer actions that are discriminatory (such as offering less training to blacks as suggested by Lazear(1979)), or from different investment strategies, in human capital terms, by blacks and whites? Even if blacks and whites follow different investment strategies, should we still attribute at least part of the outcomes in earnings to a backdrop of discrimination in the labor markets?

These are not the type of issues that are easily resolved. Available data are unlikely to allow any precise testing of the alternative theories of discrimination.

This work begins to integrate the alternative views of earnings determination with particular attention to differences in earnings between blacks and whites. The central empirical work involves estimation of earnings relationships, of a standard type, for different local labor markets, schooling groups, and race. This analysis, which allows for both individual differences and locally based demand differences, provides the basic data for investigation of the alternative factors that enter into aggregate racial differences in earnings. The next section describes the empirical models and the data, while the subsequent sections provide the empirical results.

2. EMPIRICAL MODELS AND DATA

Basic Models. The heart of this investigation is consideration of the interactions among race, characteristics of individual workers, and the reward structures of individual labor markets. This section describes the basic models and approaches. However, at the outset, it must be noted that the com-

plexity of this task, combined with the large data requirements, requires analysis of quite simplified models of individual earnings. While the models actually estimated are widely used, they are clearly incomplete when compared to some of the more detailed investigations of individual earnings. The implications of this for interpretation of results are discussed in more detail below.[6]

The basic approach of this study closely follows much of the existing empirical research into individual earnings in the specification of the basic statistical models. It differs from previous work chiefly in consideration of samples for estimation and in the interpretation of the earnings models. The most common approach to the analysis of individual earnings involves finding a sample of data that simultaneously measures individual earnings and the characteristics of the individuals and then running a cross-sectional regression of earnings on the identified characteristics. The particular characteristics of individuals that are measured varies widely across studies (and frequently are dictated more by data availability than underlying conceptual desirability). The exact focus and choice of statistical methods for the estimation also differs significantly.

Nevertheless, the core of the estimation almost always includes differences in schooling and labor market experiences across individuals. This analysis involves estimation of what, in fact, has become the "standard"

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[6] All of the analysis will consider just earnings of males. This reflects both the inadequacy of models to describe the character of earnings by females and, relatedly, inadequacy in the underlying data. In particular, as will be apparent, actual labor force experience is not directly observed; instead, "potential" experience, or time out of school, is used in the estimation. For males, this is not as severe a problem as it is for females, where intermittent labor force participation is more prevalent.

[7] The simplifications at this point are obvious. Equation 1 is not meant to

earnings relationship (following the development of Mincer(1974)):[7]

$$\log Y_i = a + b_s S_i + c_1 EX_i + c_2 EX_i^2 + U_i \qquad \text{(Eq. 1)}$$

where $\log Y_i$ = logarithm of annual earnings for individual i

S_i = years of schooling of individual i

EX_i = years of "potential labor market experience" defined as (S - Age - 6) for individual i

EX_i^2 = potential experience squared for individual i

U_i = stochastic term in earnings of individual i

a, b_s, c_1, c_2 = unknown parameters to be estimated

Local Labor Market Differences. The actual estimation, however, requires careful consideration. A central concern here is the definition of appropriate samples for the estimation. While some interpretations, particularly the purely human capital analyses such as Mincer's(1974), attempt to interpret the relationships from a strictly supply-side view, the parameters of the earnings relationships must be thought of as reduced form parameters--parameters that include both supply and demand side factors. Further, since the estimated parameters are assumed to be constant across the population ana-

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capture all individual differences that are important in earnings determination. Instead, it is meant to portray the most significant systematic differences and to provide an overall characterization of human capital differences. Reliance upon such a simplified model is chiefly dictated by data availability. Since, as discussed below, an important element of this work is the analysis of labor market differences, it is necessary to have very large samples that contain geographic information. For this, the only acceptable data set comes from the Census of Population. But these data are limited in terms of information about qualitative differences among individuals.

lyzed,[8] one must believe that the underlying structural relationships are the same for the entire sample. This would be violated if labor markets were "local" in the sense of having different underlying demand structures across local areas and if the sample data were drawn from different labor markets.

In fact, past research in earnings suggests that labor markets do indeed have a local nature. In particular, while past analyses along the lines of Equation 1 have tended to concentrate upon national samples, virtually every time any attempt is made to account for "regional" differences such differences are found to be important. Regional differences have been introduced in a variety of ways: through introduction of regional dummy variables (e.g., South), through stratification by large regions (such as South and nonSouth), through state dummy variables or state stratifications, or through stratification by individual metropolitan areas. No matter how it is done, the estimated geographic differences are invariably significant.

This, by itself, might not be entirely persuasive in indication problems with the labor market aggregation. Regional variations in labor market rewards, at any point in time, might not have any real substantive effect on the estimation if they simply reflected temporary, perhaps cyclic, differences; that is, if the basic underlying reward structure is the same, temporary fluctuations from year to year would have little serious impact on the esti-

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[8] This is not completely necessary. One can think of the underlying model as having random coefficients, coefficients that differ across individuals. If these parameters are drawn from a common distribution and the parameters for an individual are independent of the individual's characteristics, one can interpret the estimation results as estimating the population mean of the parameter distribution. While estimation using ordinary least squares may be inefficient, such estimation will be consistent as long as the normal assumptions for OLS are also appropriate.

[9] This essentially follows from the estimation of models with random coefficients; see footnote 3.

mation.[9] The justification for such an assumption typically relies upon simple theoretical models suggesting that regional variations shouldn't exist. In particular, with competitive markets and free mobility of labor, individuals should migrate to high wage areas. This will drive down wages in those areas (and raise them in sending areas), thus leading to equality of earnings across regions.[10]

However, there is other evidence that suggests labor market differences might have an important effect on the estimation of Equation 1. First, there is the previously cited evidence that virtually any measure of regional differences appears significant in earnings estimation. Moreover, there is a common pattern to these estimates; for example, earnings appear consistently lower in the South than in other areas. Second, this evidence is consistent with the aggregate decompositions of earnings. These analyses show differences that remain quite stable over time--suggesting more than simple cyclic variations about a common mean. Third, there is indirect evidence from the movement of labor itself. Most models of labor migration identify earnings differences as a key element in individual migration decisions.[11] If individuals migrate to obtain better earnings, one would not expect them to incur the substantial monetary and psychic costs involved when the earnings differences are short lived, i.e., when earnings differences at any point in time are merely temporary fluctuations. Moreover, the evidence on inter-regional

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[10] An alternative theoretical argument rests on the free trade of goods across regions. This argument, developed in the factor price equalization theorems of international trade, indicates that labor earnings should be brought into balance across regions--much as it would be through the movement of labor itself.

[11] See Greenwood(1975) for a review of migration analysis and the models typically employed. As noted there, the exact specification differs across studies, but differences in earnings possibilities quite uniformly enter.

migration is itself suggestive. At the state level, net migration over long periods of time is highly correlated (see Hanushek(forthcoming)). This suggests that, if migration is chiefly motivated by earnings differences, the patterns of earnings differences themselves remain highly correlated over time.

Reconciling the theoretical arguments, which argue against long term earnings differences, with the empirical evidence, which suggests that such differences do exist, is beyond the scope of this paper. However, the key to such conflicts probably lies in the assumptions of the theoretical models and the interpretation of them. The theoretical arguments generally assume competitive markets with no barriers to movement of labor (including no adjustment costs). They also assume no growth in the labor force, no changes in demand for labor, and so forth. Each of these simplifies the actual world but are clearly inaccurate. Further, the arguments consider the static equilibirium that will be obtained after all adjustment has occurred. While these may well describe the static equilibrium that will obtain, they say nothing about the time path, or speed, of adjustment.[12]

Based upon the available evidence of differences in labor market earnings, the empirical analysis here makes such differences a central part of the work. This enters chiefly in the definition of appropriate samples for estimation. In particular, the basic estimation of Equation 1 is conducted for individual metropolitan areas (Standard Metropolitan Statistical Areas or SMSAs). The underlying presumption is that the labor market for an individual metropolitan area is competitive, and that the earnings parameters (a, b_s, c_1, and c_2) represent reduced form coefficients specific to a local area.

[12] Indeed, some analyses suggest that regional differences are narrowing over time, even though they remain substantial.

While the earnings parameters of a given area may bear some relationship to those in other areas, through migration of firms and labor, they are nonetheless allowed to differ in accordance to local differences in supply and demand conditions.

Sample Selection. The estimation relies upon data from the 1/100 Public Use Sample of the 1970 Census of Population. This sample provides basic data on earnings, schooling, and age (which is transformed into potential experience) for individuals. The chief advantage of these data is information on the SMSA of residence for each individual. The chief disadvantage is the limited data about individual characteristics. Individuals are stratified by SMSA so that Equation 1 can be separately estimated for each local labor market--that is, the parameters of the relationship are allowed to vary freely across SMSAs.

The empirical work also goes further in the elimination of restrictions on the earnings estimation. First, Equation 1, as stated, implies that the marginal effect of different amounts schooling is constant across schooling groups.[13] Additional flexibility in the earnings relationships is allowed by also stratifying the data into two different schooling classes--high school diploma or less (S less than or equal to 12 yeas) and greater than high school eduation (S greater than or equal to 13). Note that the experience parameters are also allowed to differ by schooling class, reflecting either differing levels of on-the-job training investments in skills or differing

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[13] More precisely, since the model is specified is a semi-logarithmic form, it implies that the proportional increase in earnings for a year of schooling is constant across all levels of schooling. In investment terms, b_s has an interpretation of the rate of return on a year of schooling, and the rate of return is assumed constant across levels of schooling.

average amounts of actual labor market experience for given amounts of potential experience (that is, differing average unemployment rates). Second, since a major focus of this paper is differences in earnings by race, the data are further stratified by race (black and white). Therefore, for each metropolitan area, a total of four earnings relationships are considered--defined by schooling class and race.

The data requirements for such an exercise are clearly large, and even the Public Use Sample data are insufficient to allow estimation of all of the relationships suggested for each SMSA. In particular, sample sizes become very small for many SMSAs, especially when one considers groups that don't appear too frequently such as highly educated blacks. A somewhat arbitrary cut-off is imposed: Samples for any particular strata must include at least 25 observations of the group.

This analysis also looks at just one aspect of total earnings differences. The only earnings differences that are available from the Census data refer to annual earnings (in 1969). Annual earnings, however, are composed of two elements--wage rates times amount of work. The same observed annual earnings can arise from high wage and low amount of work time or a low wage and high amount of work time. The forces that affect work time may well differ from the forces that affect wage rates. In particular, we might believe that work time (unemployment plus length of work week) are governed importantly by cyclic factors specific to local areas while wage rates reflected more fundamental differences in labor market conditions. Therefore, the following analysis pertains just to earnings of individuals who stated they worked full-time (greater than 35 hours per week) and full-year (40 or more hours per week). For this group, annual earnings comes close to measuring wage rates.[14]

Table 1 indicates the number of regions (SMSAs) and number of observations used in the estimation of the separate models. Since the ultimate objective is a consideration of differences in earnings between blacks and whites, we only consider the estimated earnings for regions that contain sufficient observations of both blacks and whites (of a given schooling group). Therefore, while earnings models could be estimated for whites in 147 separately identified SMSAs, most of the analysis is restricted to the 34 SMSAs that also support estimation of black models for the high school strata and to the 18 SMSAs that support estimation of black models for the college strata. In terms of individual observations, there are a total of some 113,000 whites and 15,000 blacks. As noted, the blacks are considerably more concentrated in the high school group.

The table also describes the aggregate geographic distribution of the observations. The SMSAs are distributed across each of the census divisions, with the largest concentrations found in the South. (Note that the regional distribution is dictated by the relative locations of blacks, since only SMSAs contained substantial numbers of blacks are included).

3. OVERALL EMPIRICAL RESULTS

The basic analysis calls for the estimation of 204 separate models like Equation 1; this comes from 168 SMSA models for the high school group (34 white and 34 black) and 36 SMSA models for the college group (18 white and 18 black).

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[14] The full sample selection criteria were that individuals worked full-time, full-year; were not in school; had positive earnings; and were between ages 16 and 64. It was also required that individuals have a known state of birth; this was used in attempts to control for school quality, as described below.

Table 1: Numbers of SMSAs and Observations

	Total	Northeast	N.Central	South	West
Number of SMSAs					
High School	84	16	14	47	7
College	18	4	5	7	2
Number of Observations					
High School					
Black	13397	3345	3269	5865	918
White	84520	26951	23468	24156	9945
College					
Black	1600	388	448	425	339
White	28185	9200	7416	6451	5118

Interpreting the results from this extensive estimation is clearly difficult when done on a case by case basis. We therefore begin with an overall summary of the results.

To begin with, we consider an overall analysis of variance of earnings of individuals in the different groups (whites and blacks with different amounts of schooling). The variance of individual earnings can be decomposed into a portion reflecting mean differences across SMSAs (between region variance) and a remainder reflecting variance in earnings within areas (within region variance). The within region variance can be further decomposed into a portion explained by differences among individuals in the region (i.e., differences in schooling and experience) and a portion unexplained by these measured characteristics.

Table 2 displays the results of such a decomposition for all SMSAs available for the estimation.[15] Several things are worth noting in this table. First, a substantial proportion of the total earnings for the less educated black group reflects mean differences in earnings across the 34 metropolitan areas (i.e., 11 percent). While mean differences are less important for the other groups, they still exist. Second, the earnings model of Equation 1 explains between 7 and 21 percent of the individual variance within regions. Even though this appears modest, it must be remembered that the populations are estimation are much more homogeneous than usual. Through sample design and stratification, any variance in earnings that could be attributable to differing unemployment rates, race, aggregate schooling class, or geographic differentials has already been eliminated.

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[15] For this analysis of variance, data on white earnings from all 147 SMSAs are used, not just those which also support estimation of black earnings.

Table 2: Decomposition of Variance in Individual Earnings (Proportions of Individual Variance)

	Between Region	Within Region		Total Explained[b]
		Total	Explained[a]	
High school				
Black	.110	.890	.071	.173
White	.038	.962	.105	.139
College				
Black	.026	.974	.169	.191
White	.027	.973	.209	.230

Note: a. Proportion of the within region variance explained is calculated as 1. - total within region residual sum of squares/total with region variance in earnings.

b. Total explained variance is calculated as between region variance plus proportion of within region variance times proportion of total variance within regions.

The overall character of the separate earnings models can be seen in Table 3 that presents the mean values of each of the estimated coefficients for the sampled SMSAs as a whole and for the individual census divisions. (The estimates for the census divisions are based upon aggregations of the individual SMSA estimates within each division. The numbers of separate SMSAs within each division are shown in Table 1. While individual SMSAs remain the primary unit of analysis, the aggregation to census division is presented to summarize some of the overall variation in earnings relationships).[16]

Consider first the estimated schooling coefficients. These have an interpretation of a rate of return to additional years of schooling; that is, the coefficient times 100 is the percentage increase in schooling associated with an additional year of schooling. For the country as a whole, a black with twelve or less years of schooling can expect earnings to increase by 3.9 percent for each added year of schooling; a similar white can expect a 4.9 percent increase. For both races, the return to additional secondary schooling is least in the West and greatest in the South. For the college educated group, however, the added earnings from additional schooling is somewhat higher for blacks than for whites. Further, the West is no longer the best area of the country in terms of returns to schooling.

In terms of added earnings with experience, white earnings consistently rise faster than black earnings. This effect is clearest for the college group but is still seen for the high school group. At the same time, white earnings are also more peaked (that is, the negative coefficient on the quadratic term in experience is greater for whites).

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[16] Note that the aggregations to census divisions are no longer "representative" of the population because they rely upon the SMSA stratifications and the existence of at least 25 observations for each SMSA. This, however, is unlikely to cause major biases in the reults.

Table 3: Mean Estimated Coefficients for Equation 1
(Weighted by Observations)

	Total	Northeast	North Central	South	West
Schooling(b_s)					
High School					
Black	.039	.042	.031	.045	.024
White	.049	.048	.048	.057	.034
College					
Black	.117	.110	.132	.103	.125
White	.105	.110	.098	.102	.108
Experience(c_1)					
High School					
Black	.031	.030	.026	.036	.030
White	.044	.040	.045	.048	.045
College					
Black	.034	.034	.031	.033	.041
White	.062	.062	.063	.061	.065
Exper.Squared(c_2)[a]					
High School					
Black	-.049	-.045	-.039	-.056	-.051
White	-.071	-.063	-.073	-.077	-.074
College					
Black	-.076	-.061	-.071	-.075	-.102
White	-.116	-.117	-.117	-.109	-.119

Note: a. Coefficients multiplied by 100.

It should also be pointed out that these estimates perhaps misstate the true racial differential of labor market experience. The experience measure used, again, is potential experience and is the same as actual labor market experience only if the individual is fully employed from the time of leaving school. Since unemployment rates are significantly different for blacks and whites, the estimated coefficients do not accurately estimate the earnings effects of actual labor market experience. Nevertheless, even if we adjust the coefficients for mean differences in employment probabilities, we find that the picture is changed little.[17]

These estimates indicate that there are apparently significant differences in the estimated earnings relationships--differences defined by race, schooling group, and metropolitan area.[18] The exact implications of these differences for the earnings of blacks and whites is, nevertheless, complicated. Across the metropolitan areas for the study, the aggregated characteristics of workers differ (e.g., the average amount of schooling differs), the rewards to different characteristics differ (as indicated by the estimated coefficients), and the regional distribution of blacks and whites differ. Therefore, the next section attempts to disentangle the influences of these

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[17] In 1970, the unemployment rate for black males was 7.3 percent, compared with 4.5 percent for white males. We can obtain an estimate of the expected amount of actual labor market experience by multiplying potential experience times the expected probabilities of employment, as calculated from the percentages above. If we do this transformation, we obtain mean estimated experience coefficients of .033 and .046 for blacks and whites, respectively, in the high school group and .037 and .065 for the respective college groups.

[18] Formal statistical tests of coefficient differences indicate that they are significantly different across groups. However, given the fairly large samples for the separate estimations, statistical tests for differences are not very powerful.

Further, it should be noted that the differences across individual SMSAs are larger than those across the aggregated census divisions.

separate factors.

One final note about the estimates is, however, necessary before leaving the overall discussion of the estimated relationships. Clearly, the estimated models are very simple: There are many other factors which almost surely enter systematically into the determination of earnings. For example, much of the analysis of earnings has considered the issues related to omission, or poor measurement, of "ability"-- where ability is meant to imply systematic skill differences among individuals. This is but one example of a possible problem in model specification. While some attempts have been made to expand the list of descriptors for individuals, lack of data from the Census of Population precludes going very far.[19] This implies, as discussed below, some ambiguity in the interpretation of the estimated differences. Nevertheless, the available estimates should provide some bounds on the different effects.

4. DECOMPOSITION OF RACIAL DIFFERENCES

The previous section described some of the differences in estimated earnings models between blacks and whites. As noted previously this is just one component of aggregate differences in earnings. At the same time, differences in the distribution of worker characteristics (schooling and experience) and differences in the location of blacks and whites enters into the determi-

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[19] One area of attention was school quality differences. This was approached in two ways. First, following the analysis of Weiss(1970), data on regional differences in achievement was introduced. These data from Coleman et al.(1966) provided estimates of grade level equivalents on standardized reading scores by race and region. Number of years of schooling was transformed into quality equivalent years based upon the region in which an individual grew up. Second, a series of dummy variables for region grew up was introduced in an attempt to directly estimate quality differences. The first estimation was indistinguishable from that presented in terms of explained variance or significance of schooling coefficients. The second estimation did not provide any consistent estimates of regional impacts.

nation of aggregate earnings.

We begin first with a description of the aggregate differences in earnings and characteristics. Table 4 show mean earnings for blacks and whites for the nation as a whole and for the separate census divisions. The differences in mean earnings between blacks and whites in both schooling classes and across the census divisions are, as has been widely recognized, substantial.

At the same time, there are also significant differences in the average characteristics of workers. Within each schooling class, the mean black years of schooling always fall substantially below that for whites. And, black workers tend to be more inexperienced.[20]

The final two columns give some indication of the wage differentials for "similar" blacks and whites. These columns present the estimated present value of earnings for workers with exactly 12 or exactly 16 years of schooling (for high school and college groups respectively). In this, the separate regression estimates are used to calculate the expected earnings of a worker for each year of experience (and the fixed level of schooling). These are then aggregated, and discounted at 5 percent, to give an estimate of the earnings to be expected for an individual who remains in a specific region throughout his working life. This therefore summarizes the entire earnings profile estimated for each region. The results indicate dramatic differences in earnings over the lifetime. For the average black high school graduate, lifetime earnings (in 1969 dollars) fall $38,000 short of those for the average white high school graduate. For college graduates, this differential

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[20] As noted previously, the gap in actual labor market experience is larger than that portrayed in the table 4 because of higher black unemployment rates.

Table 4: Mean Earnings, Schooling and Experience
(Weighted by Observations)

	Earnings[a]		Schooling		Experience[b]		Present Value[c]	
	Black	White	Black	White	Black	White	Black	White
High School								
All	5435.	8373.	9.4	10.6	24.6	25.5	99917.	138056.
Northeast	6087.	8548.	9.9	10.7	23.9	26.3	107210.	137992.
N.Central	6467.	8897.	9.8	10.6	24.8	25.3	109839.	146394.
South	4488.	7517.	8.8	10.2	25.0	24.7	89043.	128807.
West	6584.	8912.	10.2	10.9	24.5	25.6	107484.	141030.
College								
All	8132.	12654.	14.7	15.5	16.4	18.7	151772.	205774.
Northeast	8147.	13010.	14.8	15.6	17.1	18.9	150993.	210427.
N.Central	8627.	12645.	14.6	15.3	16.7	18.4	160331.	207306.
South	7662.	12391.	15.0	15.5	15.4	18.2	135733.	198580.
West	8086.	12375.	14.5	15.3	16.7	19.2	161461.	204256.

Notes: a. Earnings means are geometric means of annual earnings for full-time, full-year workers.

b. Experience is calculated as (Age-years of schooling-6).

c. Present values of lifetime earnings streams are calculated from regression estimates for each SMSA, assuming a five percent discount rate. Calculations are based upon exactly 12 years of schooling for the high school class and exactly 16 years for the college class.

rises to some $54,000.

The previous discussion uses the estimated earnings relationships to analyze the expected differences in wages for a "typical" black and white worker: one with the same quantity of schooling who is fully employed throughout a lifetime. A different way of viewing the earnings relationships is to analyze the overall mean earnings of blacks and whites and to estimate the separate components of these differences. This is done in Tables 5 and 6. These tables combine the information about differences in average worker characteristics with the information about the earnings relationships in the different metropolitan areas.

Table 5 assumes that whites are distributed regionally in the same proportions as the observed blacks. Table 6, on the other hand, assumes that blacks are distributed in the same proportions as the observed whites. Therefore, both tables hold the regional distributions of whites and blacks constant. The impact of different regional distributions of blacks and whites can thus be seen through a comparison of the two tables.

The tables begin with the actual mean earnings for blacks and whites, divided by schooling class (columns 1 and 2). The two tables (5 and 6) differ only in the weighting of the estimates: Table 5 weights by the actual metropolitan distribution of blacks, while Table 6 weights by the distribution of whites. For blacks with 12 or less years of schooling, average annual earnings are $5,435 with the highest earnings found in the West.[21] For blacks with some college, average earnings are $8,132 with the highest averge earn-

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[21] It must be remembered that the populations used for these calculations are based upon the sample definitions used in the earnings estimation. Sampled observations must meet the selection criteria and, importantly, only SMSAs with 25 or more individuals in a given race/schooling category are included. Therefore, the populations are not truly representative of the entire population.

Table 5: Relative Black-White Earnings
(Black Regional Distribution)

	Observed Mean Earnings Black (1)	White (2)	Predicted Mean Earnings Black Coef. White Means (3)	White Coef. Black Means (4)	(1)/(2)	(3)/(2)	(4)/(2)
High School							
All	5435.	8299.	5744.	7687.	0.65	0.69	0.93
NE	6087.	8658.	6386.	8133.	0.70	0.74	0.94
N.Cent.	6467.	9032.	6666.	8564.	0.72	0.74	0.95
South	4488.	7618.	4846.	6877.	0.59	0.64	0.90
West	6584.	9108.	6812.	8687.	0.72	0.75	0.95
College							
All	8132.	12742.	8854.	11422.	0.64	0.69	0.90
NE	8147.	13145.	8966.	11832.	0.62	0.68	0.90
N.Cent.	8627.	12730.	9575.	11508.	0.68	0.75	0.90
South	7662.	12690.	8267.	11107.	0.60	0.65	0.88
West	8086.	12376.	8580.	11251.	0.65	0.69	0.91

Table 6: Relative Black-White Earnings
(White Regional Distribution)

	Observed Mean Earnings		Predicted Mean Earnings				
	Black (1)	White (2)	Black Coef. White Means (3)	White Coef. Black Means (4)	(1)/(2)	(3)/(2)	(4)/(2)
High School							
All	5729.	8373.	5993.	7841.	0.68	0.72	0.94
NE	6161.	8548.	6440.	8044.	0.72	0.75	0.94
N.Cent.	6377.	8897.	6546.	8459.	0.72	0.74	0.95
South	4511.	7517.	4828.	6830.	0.60	0.64	0.91
West	6536.	8912.	6769.	8553.	0.73	0.76	0.96
College							
All	8027.	12654.	8776.	11301.	0.63	0.69	0.89
NE	7985.	13010.	8895.	11615.	0.61	0.68	0.89
N.Cent.	8567.	12645.	9480.	11432.	0.68	0.75	0.90
South	7413.	12391.	7983.	10807.	0.60	0.64	0.87
West	8152.	12375.	8630.	11191.	0.66	0.70	0.90

ings in the North Central region. If, on the other hand , blacks were distributed across the sampled SMSAs in the same proportions as whites, the average earnings of a black with 12 or fewer years of schooling would be $5,729 (from Table 6), while average earnings for college educated blacks would fall slightly. For whites, average observed earnings based upon the actual white distribution are found in Table 6. For the two schooling classes, the average actual earnings are $8,373 and $12,554. The observed averages of whites would differ only slightly if they were distributed across SMSAs in the same proportions as blacks. For whites, the highest average earnings are found in the West for the high school category and in the Northeast for the college category; however, the variation across regions for the college category (as also indicated by Table 2) is rather small.

The next two columns provide counter factual estimates of the expected annual income of: (i) a black who was paid according to the local black earnings functions but had the characteristics of the average white in the SMSA[22] and, (ii) a black with the characteristics of the average black in the region but being paid according to the local white earnings function.[23] These estimates disentangle the effects on average earnings of differences in worker characteristics and differences in the rewards for given characteristics. In both schooling categories, the average black has fewer years of completed schooling and less experience than the average white. Given the regional distribution of blacks and the pattern of local earnings relationships (co-

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[22] All calculations are specific to the schooling class. Therefore, for example, we consider the characteristics of the average white in the high school group within each SMSA.

[23] A person with the average black characteristics paid according to the local black earnings function would have an expected income exactly equal to the observed mean black income, and similarly for white means and white earnings functions.

lumn 3), raising average black schooling and experience to that of whites would increase average black earnings for the nation as a whole to $5,993 (high school) and $8,776 (college). These average predicted earnings, however, remain substantially below those for whites (with the same average characteristics and regional distribution). On a regional basis, the largest improvement is in the South where the disparities in average schooling levels between whites and blacks is largest.

Column 4 considers the effects of differences in the earnings functions, or rewards for specific factors, between blacks and whites. In these calculations, the regional distribution of blacks and the average characteristics of black workers are held constant, and average black earnings based upon the white earnings functions are calculated. Here the differences are much more dramatic. For the nation as a whole, average black earnings are predicted to rise to $7,687 and $11,422 for the high school and college groups, respectively. For the high school group, the rise would be even somewhat larger if blacks also were distributed across SMSAs in the same proportions as whites (Table 6).

The results of these estimates are summarized in the final three columns of the tables. These columns provide comparisors with observed mean white earnings (by schooling class and area of the country). The first is the ratio of actual black earnings to those of white; the following two rely upon the predicted earnings for blacks from the two counterfactual cases.

Concentrating upon Table 5, we see that actual black earnings are 65 percent of white earnings for the high school group (64 for the college group). The adjustment for differences in characteristics indicates that black workers would receive 69 percent of what white workers receive if they had the

same levels of schooling and experience but were paid according to black earnings schedules. However, they would have ninety percent or more of white earnings if they could be paid according to the white earnings functions (but still had their lower observed levels of schooling and experience). In other words, equalizing differences in characteristics would close 11-14 percent of the racial gap in incomes, but equalizing the payments for the measured characteristics would close 70-80 percent of the gap.

Across the different census divisions, the picture is quite consistent. Different reward structures, and not differences in worker characteristics, account for the vast majority of the differences in mean earnings for blacks and whites.

Table 6 merely reweights the earnings by the white distribution of workers across local areas. While there are some small differences between Tables 5 and 6, they do not appear significant. In other words, differences in the relative locations of black and white workers has little effect on the relative mean earnings, either observed or predicted.

At this point, we must return to issues of specification of the earnings models. The models capture differences in rewards that are related to the measured characteristics of workers. To the extent that the measured characteristics do not index differences that are important across workers, strict interpretation of the different coefficients may be misleading.[24] Again, consider the simple example of school quality: If every year of schooling by blacks involves less "learning" than years by whites, a white and black with the same measured years of schooling would have systematic differences in skills. In this case, we would expect a smaller schooling coefficient for

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[24] For a general discussion of these issues, see Griliches(1977).

blacks than for whites, even if the monetary rewards for actual learning were the same. Because this seems like a real possibility, it is not reasonable to conclude that the differences in earnings parameters reflect pure discrimination.

5. SOME CONCLUSIONS

The previous analysis has considered how interactions among race, characteristics of workers, and the structure of earnings for different individuals lead to the observed aggregate differences in black and white earnings. The basic conclusion is that differences in rewards, or payments to different individual characteristics, between blacks and whites are the major source of differences in aggregate earnings. Many people would perhaps argue that this was obvious. But, if obvious, it is strangely at odds with a variety of policies. Policies such as providing freer access to schools or improving school retention for blacks are directed at equating the characteristics of black and white workers in the schooling dimension. And much of the attention to migration is concerned with improving the earnings of blacks through redistribution across labor markets. These policies flow from observations about the lower schooling levels of blacks and the distinct differences in locational patterns between races--but presume that black rewards to these factors will be sufficient to close substantially the observed earnings differeneces. The evidence suggests such reductions in earnings will be relatively modest. For example, keeping the current distribution of blacks and whites across areas at the 1970 observed distribution, equating experience and schooling levels of the average black in the high school class would increase relative black-white mean earnings from .65 to .69. Similarly, shuf-

fling the regional distribution of blacks to match that of whites (but keeping average worker characteristics and rewards constant) would increase mean black relative earnings from .65 to .68. On the other hand, holding individual characteristics and geographic location constant but paying blacks according to the white earnings schedules for each SMSA would increase relative earnings from .65 to .92; in other words, over three fourths of the earnings gap would be closed.

Interpretation of these results must, nevertheless, be made within the context of the very simplified models of individual earnings. While some attempts were made to include effects of differential school quality, they were largely unsuccessful, and the final models describe earnings differences among individual simply in terms of years of schooling and experience levels of individuals. Because blacks and whites may differ in terms of unmeasured attributes (such as school quality or abilities), the estimated earnings differences would be distorted by these. Therefore, the differences in earnings attributed to differences in reward structures based solely on these measured characteristics cannot be taken as a measure of pure wage discrimination.[25] These estimates do provide some bounds on potential levels of wage discrimination--and the evidence suggests substantial room for discrimination.

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[25] Here the definition of discrimination is differences in wages for "identical" individuals of different races. The comparisons only refer to individuals who are the same in terms of the measured characteristics of the earnings functions.

[26] More exactly, they refer to the earnings of full-time, full-year workers. Since the average black is much less likely to be such a worker, the earnings differences for the entire population are understated in this analysis.

Finally, all of the estimates refere to earnings in 1969.[25] They do not provide any information about changes that might have occurred since then. The evidence about dynamic changes is mixed. Smith and Welch(1977) argue that there was steady improvement in the relative earnings of blacks over the decade of the sixties, and this would suggest that the situation may well have improved during the seventies. On the other hand, Lazaer(1979) argues that this improvement may have been illusory--that employers raised current wages in response to governmental pressures through reducing the amount of training provided to blacks. If this were true, one might expect a widening of disparities since 1969. Thus, it seems that extrapolation at this time would be difficult.

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